

IN THE CLAIMS:

1. – 43. *cancelled*

44. (*currently amended*) A method of operating a computer processor, the computer processor using computer software, the computer software being is configured to simulate both the electrical characteristics and the optical characteristics of an SOI-based integrated optical/electronic circuit, the method comprising:

a) ~~generating topology information and free carrier concentration information by~~ simulating operation of at least certain electronics circuits components of said SOI-based integrated optical/electronic circuit using an electronic design portion of the computer software to generate as outputs dopant profiles, topology information and free-carrier concentration information and time-dependent variations in the free-carrier concentration as a function of applied voltage;

b) applying the output information from the electronic design portion of the computer software as inputs to an optical design portion of the computer software to extract top-level optical parameters such as optical loss, optical phase and extinction; and

c) ~~co-simulating electrical and optical behavior operation of at least certain optical circuit~~ of said integrated optical/electronic circuit through said electrical and optical computational engines to predict the optical behavior of said SOI-based integrated optical/electronic circuit in an optical design portion in response to said topology information and said free carrier concentration information generated by said electronic design portion.

45. – 46. *cancelled*

47. (*currently amended*) The method of claim 44, wherein ~~said~~ the electronic design portion of the computer software includes at least one of the group consisting of a process simulation portion, a device simulation portion, a layout portion, a parasitic extraction portion, and a circuit simulation portion.

**48. (currently amended)** The method of claim 44, wherein said optical design portion of the computer software further comprises at least one of the group consisting of: ~~a waveguide grating portion, a diffraction optical element portion,~~ a finite difference time domain (FDTD) portion, ~~a thin film portion,~~ a beam propagation method portion, and a raytracing portion.

**49. – 54. cancelled**

**55. (currently amended)** The method of claim ~~44~~ 54, wherein the optical design portion of the computer software ~~simulation design tools portion~~ partially models a waveguide included in said at least certain optical circuits components of the SOI-based integrated optical/electronic circuit.

**56. (currently amended)** The method of claim 55, wherein the said SOI ~~substrate circuit~~ includes a substrate layer, and wherein the said waveguide at least partially extends within said substrate layer.

**57. cancelled**

**58. (new)** The method of claim 44, wherein the electronic design portion of the computer software simulates at least one electronic circuit component from the group of a p-n device, a field plated device, an avalanche photodiode, a Schottky device, a MOSCAP, and a MOSFET.